endosperm nucleus, which is fertilized by the second male nucleus, divides near the lower end of the sac, and following this division the protoplasm is separated by a plasma membrane into a large upper and a small lower cell. After two more divisions in the lower cell, walls appear, and four basal endosperm cells are formed. These elongate and divide again to form eight cells with dense contents which form a cap over the lower end of the more extensive endosperm tissue above. This lower tissue, while not so extensive, is similar in origin to that recently described in the Pontederiaceae. After examining the food-stuffs of the seed, the author closes with a description of a special tissue formed from the funiculus, which serves to separate the seed from the placenta.—W. C. COKER.

Roots of aroids.—LINSBAUER[10] has studied the growth and geotropism of the aerial roots of a large number of aroids. These are often dimorphic; some roots are long and strong, the so-called *Nährwurzel* (here called long roots); others are more slender, usually horizontal and tufted, the *Haftwurzel* (here called short roots). Of these only a few have been sufficiently examined since the rise of the statolith theory of geoperception. He extends SACHS'S observation as to the great length of the growing zone; in long roots for most it lies between 20 and 50^{mm} with a minimum of 5–10^{mm} and a maximum of 90^{mm}; in short roots, however, it runs from 3–14^{mm}. Yet the former grow less rapidly than the latter; nor do either grow daily more *in toto* than ordinary soil roots, and their growing zone is not so sharply marked. The typical long roots are mostly geotropic, though only weakly so, for in a whole day they do not curve from the horizontal to the vertical; and many, even under the most advantageous external conditions, are wholly or periodically ageotropic; typical short roots are always ageotropic.

When the roots are not dimorphic (as in Anthurium and some other genera), they are ageotropic. Both sorts have a well-developed columella in the root cap, which is furnished, so long as they are growing, with statolith starch, quite irrespective of their geotropic or ageotropic behavior. This fact LINSBAUER contents himself with stating and does attempt to use it against the theory or to reconcile it therewith.—C. R. B.

Production of diastase.—EISENBERG has attacked anew the problem of the regulatory production of diastase, determining the effect of various factors on its formation.[11] This was estimated by the effectiveness of a given solution in converting into sugar a standard solution of soluble starch. The results coincide in large measure with those of previous observers and strengthen the belief that diastase is formed in variable amounts according as other metabolic factors vary. Thus more diastase is produced in active, less in sluggish, germination. At the optimum temperature for growth diastase production is greatest. In germinating

[10] LINSBAUER, K., Ueber Wachstum und Geotropismus der Aroideen-Luftwurzeln. Flora **97**:267–297. 1907.

[11] EISENBERG, ELFRIDE, Beiträge zur Kenntnis der Entstehungsbedingungen diastatischer Enzyme in höheren Pflanzen. Flora **97**:347–374. 1907.

wheat in the absence of oxygen, there is no increase in diastase, but the amount formed in air and in pure O_2 is equal. Increasing etherization of seedlings reduces their growth and also the diastase. Traces of acid favor the production of secretion diastase, but not of translocation diastase, while larger amounts hinder in both. In general leaves that readily store starch have much diastase, while those that contain sugar do not; but this is not uniformly true. Insolated starchy leaves have more diastase than starch-free shade leaves of the same plant. No increase of diastase on darkening pea leaves was observable; but the author does not consider the experiments with light satisfactory.—C. R. B.

Nourishment of embryos.—Basing his study upon the conclusions, already well established, that the endosperm is a live tissue which may affect *ipso facto* the development of the embryo, STINGL reports the results[12] of his experiments to determine how embryos were affected by other endosperm than their own. He tested rye, barley, oats, and wheat reciprocally. No embryo freed from the endosperm could be made to develop fully, nor even when replaced after the operation did it develop as well as undisturbed ones. The four sorts were unequally affected. Rye developed about equally with its own and wheat endosperm; not so well with others. Wheat did better with rye endosperm than with its own, but not so well with barley and oats. Barley flourished with wheat endosperm, grew less with its own and rye, and least with oats. Oats embryos developed far more uniformly with strange endosperms than the others did with oats endosperm, though it did best with its own. One must suspect that some neglected factor is accountable for the surprising conclusion that a plant may develop better with foreign endosperm than with its own.—C. R. B.

Alpine plankton studies.—SHANTZ[13] has made a comparative study of the plankton of the lakes of the plains and mountains near Pike's Peak. The different alpine lakes studied differ somewhat largely from each other, but in general their plankton is not abundant, and it is only in the fall that algae become dominant. The plains lakes studied are artificial; their plankton is many times more abundant than is that of the alpine lakes.—HENRY C. COWLES.

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[12] STINGL, G., Experimentelle Studie über die Ernährung von pflanzlichen Embryonen. Flora **97**:308–331. 1907.

[13] SHANTZ, H. L., A biological study of the lakes of the Pike's Peak region—preliminary report. Trans. Amer. Mic. Soc. **27**:75–98. 1907.